THE OSHA RFI QUESTIONS
ON IAQ ORGANIZED BY
SUBJECT MATTER

INDEX

BACKGROUND

Background [A]: Health complaints related to indoor air quality (IAQ) increased significantly following energy conservation measures instituted in the early seventies. Such measures have generally reduced the infiltration of outside air, allowing the build-up of indoor air contaminants.

Adverse health effects which may be associated with indoor air contaminants are classified as: (1) sick building syndrome (sometimes called tight building syndrome), and (2) building-related illness.

Sick building syndrome is characterized by general complaints which may include headaches, fatigue, nausea, mucous membrane (eye, nose, and throat) irritation, coughs and muscle pain. These conditions generally are not traceable to a specific substance, but are sometimes attributable to exposure to a combination of substances or to individual susceptibility to lower concentrations of contaminants. Typically, the symptoms are reversible, disappearing or dissipating when the affected individuals leave the building.

The term "building-related illness" describes those specific medical conditions of known etiology which can often be documented by physical signs and laboratory findings. Such illnesses include respiratory findings. Such illnesses include respiratory allergies and Legionnaires' disease. Building-related illnesses are potentially severe and, in contrast to sick building syndrome complaints, are often traceable to a specific contaminant

source such as mold infestation and microbial growth in cooling towers, air handling systems and water-damaged furnishings.

Background [B]: OSHA believes that the major sources of indoor air pollutants include the following:

1. Sources outside the building, e.g., contaminated ambient air and radon.

2. Emissions from nearby sources, e.g., vehicular emissions from garages, loading platforms and nearby roads.

3. Equipment, e.g., contaminated HVAC systems and emissions from office equipment.

4. Human activities, e.g., smoking, housekeeping activities, maintenance activities, and pest control.

5. Building components and furnishings, e.g., emissions from new furnishings and carpets.

Analyses of specific pollutants in indoor workplaces have identified several hundred volatile organic chemicals (VOCs) as well as other compounds. Several chemicals have been identified for which OSHA has established permissible exposure limits (e.g., formaldehyde, acetic acid). However, investigations of employee complaints regarding indoor air quality have generally shown levels well below permissible exposure limits for OSHA-regulated substances.

Background [C]: Over the past decade, the National Institute for Occupational Safety and Health (NIOSH) has conducted approximately 500 Health Hazard Evaluations for indoor air quality. (Health Hazard Evaluations are workplace investigations conducted at the invitation of the employer to determine the presence of health hazards and to recommend measures to remove them.) The primary types of problems encountered in these investigations were categories as: inadequate ventilation (52%); contamination from inside the building (17%); contamination from outside the building (11%); microbiological contamination (5%); contamination from building materials and furnishings (3%); and unknown sources (12%).

DESIGN, RENOVATION, HVAC, AND VENTILATION

DESIGN & VENTILATION

According to the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), two fundamental procedures are used to improve indoor air quality: (1) Increase ventilation, thereby increasing fresh air introduction and (2) measure air contaminant levels and contain them below specified levels (ASHRAE 1989). Thus, air quantity and quality are important considerations in ensuring clean indoor air. The following questions cover ventilation systems and their relative effectiveness.

[1] Design & Ventilation [OSHA 21]: Please describe the industry you are part of and the type(s) of ventilation system(s) used currently in your workplace?

a. Natural - wind through open doors or windows

b. General Exhaust - strategic placement of fans

c. HVAC System - centrally controlled heating, ventilating, and air conditioning system

[2] Design & Ventilation [OSHA 4]: At least one report (Woods 1989) estimates that between 800,000 and 1,200,000 commercial buildings in the United States have problems that may be classified as Sick Building Syndrome, potentially affecting some 30 to 70 million occupants. The Agency solicits additional data relevant to the development of more precise estimates of the number of workplaces with indoor air quality problems and the number of employees adversely affected.

[3] Design and Ventilation [OSHA 22]: Do you have specific data indicating that Variable Air Volume (VAV) systems are associated with more IAQ complaints than Constant Volume (CV) systems?

[4] Design & Ventilation [OSHA 44]: Do you increase ventilation flow in particularly crowded worksites or conversely reduce ventilation during non-work hours?

[5] Design & Ventilation [OSHA 45]: Is it part of your company's or building owner's policy to follow the ASHRAE Standard 62-1989 regarding the introduction of fresh outdoor air into the ventilation system?

[6] Design & Ventilation [OSHA 46]: If the answer to question 45 is yes, do you consider the specific type of work environment in determining the appropriate quantity of fresh air to introduce? For example, the ASHRAE recommended level for smoking lounges 60 Cubic Feet per Minute per person (CFM/person) as opposed to 20 CFM/person for regular office space.

[7] Design & Ventilation [OSHA 50]:

a. Have you found that redesigning the workplace interior (e.g., as in renovation), leaving the ventilation system along, results in improper distribution of air?

b. If so, what types of problems ensue after the remodeling?

[8] Design & Ventilation [OSHA 51]: ASHRAE set its recommendations assuming 100% fresh outdoor air introduction, but states that properly filtered, recirculated air at the same flow rates will adequately remove contaminants to acceptable levels.

a. Do you agree with this statement?

b. If yes, please provide information which supports recirculating filtered air as a healthy alternative to 100% fresh air introduction.

c. If not, what types of problems are associated with recirculated air?

[9] Design & Ventilation [OSHA 52]:

a. If you recirculate indoor air, do you seasonally adjust the amount of outdoor air your system takes in?

b. If so, have you observed any trends in illnesses or complaints which parallel the adjustments?

c. Have you observed any seasonal trends regarding illnesses or complaints independent of adjustments to the system?

[10] Design & Ventilation [OSHA 53]: Is the current ventilation system the original design or has your company retrofitted a system to improve indoor air quality?

[11] Design & Ventilation [OSHA 69]: ASHRAE has specified a series of recommended indoor air quality standards to control common indoor contaminants. Commonly mentioned control techniques other than increasing ventilation flow include product improvement (e.g., lead-free paint), filters and electrostatic precipitators (for particulates), and absorbing charcoal beds (to remove gaseous contaminants). Have you employed any of these devices or techniques to improve overall air quality inside your facility?

[12] Design & Ventilation [OSHA 70]: If yes, please describe the devices or techniques that you have employed?

[13] Design & Ventilation [OSHA 71]:

a. If you believe that OSHA should adopt the ASHRAE standards for controlling occupational exposures to indoor air contaminants, please provide any quantitative information you have to support their effectiveness in improving air quality.

b. If you do not believe that the ASHRAE standards are sufficient, please recommend what other actions should be taken.

[14] Design & Ventilation [OSHA 72]: Please estimate what you believe the capital costs would be of incorporating the ASHRAE standard into your building's design and how doing so would affect the cost of renovation projects.

[15] Design & Ventilation [OSHA 73]: How effective have modifications in ventilation systems and IAQ monitoring been in reducing the number of related illnesses and complaints in your workplace?

INVESTIGATIONS, MONITORING, EXPOSURE ASSESSMENT

[16] Investigations, Monitoring and Exposure Assessment [OSHA 14]: If your company keeps records of employee IAQ complaints, can you summarize your experience, emphasizing your efforts to localize the problem, identify the contaminants, determine the adverse health effects, and action taken?

[17] Investigations, Monitoring and Exposure Assessment [OSHA 15]: Considering the wide variation in individual responses to chemical or biological exposures and other factors related to indoor air quality, what events should trigger an IAQ investigation?

[18] Investigations, Monitoring and Exposure Assessment [OSHA 16]: What physical evidence which might trigger an IAQ investigation (such as stagnant water, mold, broken fans, dirty vents, barriers to good air mixing, new carpeting/insulation) have been identified by you or your employees?

[19] Investigations: Monitoring [OSHA 17]: Dust mite infestations in indoor environments are implicated as a cause of allergic reactions and exacerbation of asthma. Recognized as a significant problem in residences, such infestations may be associated with similar complaints in occupational settings.

a. Has your workplace ever monitored for dust mites?

b. If yes, why was the monitoring conducted?

c. Did the results of the monitoring indicate a dust mite infestation?

d. What methods were used to determine the presence of dust mites?

[20] Investigations, Monitoring and Exposure Assessment [OSHA 20]: Have you made measurements of ventilation rates (in terms of air exchanges or CFM)?

a. If so, what were the measurement results?

b. Have you sampled for bioaerosols or other contaminants, e.g., respirable suspended particles?

c. Was there any correlation between the ventilation measurements and sampling results?

[21] Investigations, Monitoring and Exposure Assessment [OSHA 23]: What monitoring techniques other than ventilation rates do you use to measure indoor air quality in our workplace?

[22] Investigations, Monitoring and Exposure Assessment [OSHA 24]: Current IAQ investigations indicate that ambient levels for specific substances are typically found to be within occupational exposure limits.

a. If your workplace has conducted air monitoring for specific substances, why was such sampling done?

b. For what substances did you monitor?

c. What were the concentrations for each substance?

d. What types of instruments were used in conducting the sampling?

e. How often did you conduct the sampling?

[23] Investigations, Monitoring and Exposure Assessment [OSHA 25]: Specifically, carbon dioxide at levels of 800 to 1,000 ppm has been a traditional indicator of poor indoor air quality due to poor air exchange.

a. Have you conducted any carbon dioxide monitoring?

b. If so, what concentrations were found?

[24] Investigations, Monitoring and Exposure Assessment [OSHA 26] (see also OSHA 2):

a. Is there any evidence to suggest that IAQ complaints coincide with specific amounts of specific volatile organic chemicals (VOCs) in air (e.g., formaldehyde)? This is, can VOCs in mg/m^3 be used as a measure of IAQ?

b. Are there practical sampling methods available for estimating total VOCs in air?

[25] Investigations, Monitoring and Exposure Assessment [OSHA 27]: NIOSH has developed guidelines for IAQ investigations (NIOSH 1987). If your workplace has conducted investigations:

a. Did you try an approach different from NIOSH's in your investigation?

b. If yes, please explain how your approach differed from the NIOSH guidelines.

[26] Investigations, Monitoring and Exposure Assessment [OSHA 28]: Did you use existing staff (e.g., a staff industrial hygienist), or external assistance (e.g., OSHA consultative services or a private consultant), in conducting the monitoring?

[27] Investigations, Monitoring and Exposure Assessment [OSHA 29]: What were the costs of the survey? Please separate them, if possible, into direct costs (such as detector tubes and labor costs), and indirect costs (such as durable item equipment and clerical support).

[28] Investigations, Monitoring and Exposure Assessment [OSHA 30]: In the laboratory evaluation of monitoring samples, did you use laboratory staff or contract with an outside analytical service?

[29] Investigations, Monitoring and Exposure Assessment [OSHA 31]: What were the laboratory costs associated with the samples?

[30] Investigations, Monitoring and Exposure Assessment [OSHA 32]: In the absence of visible indicators of potential microbial growth such as water-damaged carpeting or furnishings and accumulation of water and slime in HVAC components, what conditions would indicate the need for bioaerosol monitoring?

[31] Investigations, Monitoring and Exposure Assessment [OSHA 33]:

a. If you suspect bioaerosol contamination, what sampling techniques do you use to determine the presence or concentration of such contaminants?

b. What have been the results?

c. Were any remedial actions necessary?

d. If so, what actions did you take?

e. Did you resample following the initial actions?

f. Did it make a difference?

OPERATION AND MAINTENANCE

[32] Operation and Maintenance [OSHA 55]: What are the operating costs, exclusive of maintenance, for your ventilation system?

[33] Operation and Maintenance [OSHA 56]: What is your average cost per year for maintenance (in terms of cleaning, repairing, and replacement parts)?

[34] Operation and Maintenance [OSHA 57]: If changes have been made to upgrade the ventilation system, why were they made and what were the costs associated with the mechanical improvements?

[35] Operation and Maintenance [OSHA 58]:

a. Did the operating costs including those for energy and maintenance change after the upgrade?

b. If so, did they increase or decrease, and by how much?

[36] Operation & Maintenance [OSHA 74]:

a. Do you have a comprehensive program of regular HVAC system inspection and maintenance?

b. If so, what does the program consist of?

ETS

ETS

A wide-spectrum of health effects, including headaches, upper respiratory tract irritation, low birthweight, cardiovascular disease, and lung cancer has been associated with nonsmoker exposure to passive tobacco smoke (PST). Response to the following questions is requested to enable OSHA to identify specific worker populations that may be sensitive to passive tobacco smoke exposure in the workplace.

[37] ETS [OSHA 7]: Persons with underlying health problems or chemical sensitivities often cannot work in industries where physical strength and endurance or exposure to chemicals occur in the normal job experience.

a. Is there evidence to suggest that these persons are more susceptible to developing health effects due to short-term exposure to PTS, such as eye and respiratory tract irritation?

b. Is there evidence to suggest that these persons are more susceptible to developing health effects due to long-term exposure to PTS, such as cardiovascular disease and lung cancer?

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[38] ETS [OSHA 8]: Some people may develop an increased sensitivity to chemical pollutants, such as found in PTS, during pregnancy or treatment with certain medications (Calabrese 1978). What additional studies pertain to this sensitivity?

[39] ETS [OSHA 9]: OSHA requests data on the annual incidence rate of chronic obstructive lung disease, asthma, and allergies in the general population. If available, these data will assist the Agency in estimating accurate risk numbers.

[40] ETS [OSHA 10]: OSHA requests the latest, most accurate data on smoking behavior in the working population, with as much detail as possible with respect to age, group, sex, race, and occupation.

[41] ETS [OSHA 11]: To your knowledge, have PTS exposures been associated with specific adverse health endpoints in humans?

[42] ETS [OSHA 12]: To your knowledge, have PTS exposures been associated with specific adverse health endpoints in experimental animals?

ETS

The following questions specifically ask for information on exposure assessment of workers exposed to ETS (PTS) and on smoking policies adopted by various employers:

[43] ETS [OSHA 34]:

a. Have you conducted IAQ assessments relative to tobacco smoke contamination?

b. If yes, for what substance(s) did you measure and what were your results?

c. What was the cost in terms of personnel and laboratory services?

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[44] ETS [OSHA 35]:

a. Is information available on the concentration of PTS components, such as nicotine and particulate matter, detected in the air of indoor workplaces?

b. If you know of such information, please provide available references.

[45] ETS [OSHA 36]: Are data available that demonstrates specific ranges of concentrations of cotinine or other biomarkers in biological tissues that are associated with specific levels of exposure to nicotine in PTS?

[46] ETS [OSHA 37]:

a. What is the relationship between inhaled nicotine and cotinine levels in body fluids?

b. How does this relationship differ for smokers versus nonsmokers?

[47] ETS [OSHA 38]: Are there identifiable biological markers for cumulative exposure which would facilitate investigation of chronic diseases associated with exposure to PTS?

[48] ETS [OSHA 39]:

a. In workplaces where a restricted smoking policy has been implemented, has monitoring and evaluation been performed to determine its effectiveness in reducing levels of PTS components?

b. If so, what substances are monitored?

c. How is this monitoring conducted and how frequently is the policy evaluated?

[49] ETS [OSHA 48]: What data are available correlating PTS concentrations to ventilation rates and density of smokers?

[50] ETS [OSHA 40]: If you believe there is an acceptable level of passive tobacco smoke in indoor air, how would you maintain this level in your building? What ventilation rate would be appropriate to solve this PTS problem?

ETS/SMOKER SEPARATION AND CONTROL ISSUES

ETS/SMOKER SEPARATION & CONTROL ISSUES

The following questions address means of limiting worker exposure to PTS:

[51] ETS/Smoker Separation & Control [OSHA 61]: If you use smoke reduction methods:

a. What types do you use?

b. What is the yearly cost of the program (1) per employee and (2) per cubic foot of workplace space?

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[52] ETS/Smoker Separation & Control [OSHA 62]: If smoking is allowed in indoor work areas, what should be done to assure that nonsmokers are protected from exposure to PTS?

[53] ETS/Smoker Separation & Control [OSHA 63]: In your opinion, should smoking control policies differ for different types of workplaces (e.g., factories, offices, stores, restaurants)? If your answer is yes, please state your reasons why you believe this?

[54] ETS/Smoker Separation & Control [OSHA 64]:

a. If your company confines smoking to designated areas, is the ventilation in such areas mixed with outside air and distributed to nonsmoking areas?

b. Has monitoring ever been conducted to determine the transfer of smoke constituents from the designated smoking areas to nonsmoking areas? If so, can you supply the results or describe them?

[55] ETS/Smoker Separation & Control [OSHA 65]: In companies that allow smoking throughout the workplace, describe what, if anything, is done to reduce nonsmoker's exposure to PTS?

[56] ETS/Smoker Separation & Control [OSHA 66]:

a. In your experience or opinion, is it feasible to reduce PTS contaminant levels to adequate levels just by increasing ventilation?

b. If so, are costs in equipment and maintenance any different than those required for maintaining good indoor air quality?

c. If the answer to b. is yes, what is the cost difference?

[57] ETS/Smoker Separation & Control [OSHA 67]:

a. Is it necessary to use separation ventilation in smoking areas to reduce the possibility of cross-contamination during air recirculation from smoking areas to nonsmoking areas?

b. If not, explain why cross-contamination of recirculated air is not a problem.

[58] ETS/Smoker Separation & Control [OSHA 68]:

a. In smoking areas, what types of commercial room air cleaners (e.g., desk top air cleaners, ionizers) other than ventilation are used to reduce levels of PTS?

b. How do you know they are effective in removing smoke from the air?

c. List other commercial air cleaners which are effective in removing PTS-related gases and particulates from the embient air.

[59] ETS/Smoker Separation and Control [OSHA 77]: If your company allows smoking in indoor areas, please state any restrictions that may apply:

a. Is smoking restricted to designated smoking areas?

b. Is smoking restricted during certain times?

c. Are other restrictions enforced (if so, please state what they are)?

[60] ETS/Smoker Separation and Control [OSHA 78]: In your opinion or from your experience, are there specific workplaces where it would not be feasible to comply with a standard that consists of any of the following:

a. Smoking in designated areas only,

b. Smoking in a designated area with separate ventilation,

c. Limited exposure to specific levels of PTS components, or

d. A total smoking ban in indoor work areas?

[61] ETS/Smoker Separation and Control [OSHA 79]: If your company has developed and implemented a smoking control policy:

a. What conditions existed that prompted this action?

b. Did the development and implementation of a successful smoking policy involve broad participation? For example, did the groups that participated include: management, union representatives, employees, smokers and nonsmokers?

c. With regard to current policy in your workplace, how many workers are affected by the policy?

d. What has been the effect of any smoking restriction on smoker behavior?

[62] ETS/Smoker Separation and Control [OSHA 80]:

a. Once a policy was implemented, did you provide smokers with information and access to non-coercive stop-smoking aids, such as smoking cessation clinics, counseling, and self-help materials?

b. If you did, was it effective in helping smokers to quit?

[63] ETS/Smoker Separation and Control [OSHA 81]:

a. What means do you use to enforce the [smoking] policy?

b. Do you use signs to post designated smoking areas?

[64] ETS/Smoker Separation and Control [OSHA 82]: In the experience of companies that have implemented smoking control policies:

a. Have costs of implementing and monitoring the policy been estimated?

b. What are these costs?

BIOAEROSOLS

[65] Bioaerosols [OSHA 5]: In cases where IAQ investigations have identified a bioaerosol as the etiologic cause of a building-related illness:

a. Did complaints occur within a specific length of time?

b. Were there similarities in symptoms among affected individuals which suggested exposure to a specific agent, e.g., Legionella pneumophila? Was the etiological agent identified?

c. What laboratory tests were performed to confirm that a specific bioaerosol was responsible for health complaints?

d. How was the problem resolved?

[66] Bioaerosols [OSHA 6]: IAQ investigations conducted by NIOSH indicate that some type of biological contaminant was involved in five percent of the cases.

a. Are there other data available which indicate the prevalence of biological contaminants as the cause of adverse health effects? If so, please indicate the source of such data.

b. Are data available which indicate the likelihood that health complaints are related to a specific bioaerosol contaminant? If so, please indicate the source of such data.

[67] Bioaerosols [OSHA 18]: Colony forming unites (cfu) are the usual units used to express measurements of bioaerosols. What correlation, if any, can be made between the number of cfu per cubic meter of air and the potential to cause adverse health effects in susceptible individuals exposed to such contaminants?

[68] Bioaerosols [OSHA 19]: What data, if any, are available that suggest that the effects of bioaerosols are influenced by seasonable changes?

[69] Bioaerosols [OSHA 42]: Some citations in the literature state that the primary source of bacteria released into the indoor environment is the human body. Has your workplace addressed spatial considerations to prevent overcrowding, and thus reduce the person to person spread of disease? How did you do this?

[70] Bioaerosols [OSHA 43]: Do you have evidence to show that overcrowding is a source of bioaerosol formation?

[71] Bioaerosols [OSHA 54]: Is it possible to mitigate IAQ problems due to bioaerosol contamination just by properly maintaining the ventilation systems in respect to microbial growth, fungal growth, etc.?

RADON

[72] Radon [OSHA 40]: Have you ever monitored for radon in your workplace?

[73] Radon [OSHA 41]: If you have monitored for radon in the workplace:

a. Why did you?

b. Who did the monitoring?

c. What was the resulting radon level?

d. Where was the monitoring done (basement, main floor, higher floors)?

e. What type of monitoring was used (alpha track, charcoal, etc.)? How much did the monitoring cost?

f. Over what period of time did monitoring take place?

g. How long was each monitor left in place?

[74] Radon [OSHA 85]: If, as a result of monitoring for radon, you determined that action was required to reduce the level:

a. What action was taken?

b. Was monitoring performed subsequent to abatement action?

c. To what extent did the abatement change the levels?

d. What was the cost of such mitigation?

HEALTH EFFECTS OF IAQ

[75] Health Effects [OSHA 1]: How would you define poor indoor air quality? [Note -- are there non-health factors in an IAQ definition?]

[76] Health Effects [OSHA 2]: OSHA solicits the following information with respect to adverse health effects associated with poor indoor air quality:

a. What data are available that associate adverse health effects with exposure to the following types of indoor air contaminants?

1) Chemical agents

2) Bioaerosols

3) Passive tobacco smoke

4) Radon

b. Based on observations in your workplace or your knowledge of research results, describe the adverse effects that you believe may be attributable to the quality of indoor air.

c. What percent of the workforce suffers adverse health effects due to poor indoor air quality in their workplace? What is the basis for your estimates?

d. based on observations in your workplace or your knowledge from other sources, how much lost work time and decreased productivity may be traceable to illnesses related to poor indoor air quality? What is the basis for your estimate?

e. Are there any other indicators of workers' illness related to poor indoor air quality?

[77] Health Effects [OSHA 3]:

a. What correlation, if any, can be made between symptoms presented in IAQ complaints and type of causative agent? For example, are certain symptoms more indicative of exposure to chemical contaminants as opposed to biological contaminants? Please give examples.

b. If such a correlation has been made, how effective is this information in identifying sources of contaminants?

[78] Health Effects - General [OSHA 47]:

a. If you do not follow the ASHRAE guidelines, do you believe one minimum acceptable CFM/person threshold exists for all indoor work environments which would successfully alleviate all health effects?

b. What would you recommend that level to be? Please provide supporting information.

PSYCHOSOCIAL-PHYSICAL

PSYCHOSOCIAL/PHYSICAL

With respect to IAQ problems, certain reports indicate that multiple factors may influence health complaints. Such factors may include psychosocial considerations, physical stressors, such as temperature, lighting and noise and ergonomics.

[79] Psychosocial/Physical Factors [OSHA 13]:

a. Have these factors been considered in instances where IAQ investigations have failed to identify a specific contaminant source?

b. If yes, was remedial action taken to improve these conditions? Please explain what that action was.

c. Did health complaints decline?

INSURANCE

INSURANCE

Some insurance carriers have been said to increase premiums of companies with inadequate ventilation systems due to potential lawsuits by employees whose health has been adversely affected by poor indoor air quality.

[80] Insurance [OSHA 59]: Has your company experienced an increased insurance premium directly or indirectly attributable to poor indoor air quality?

[81] Insurance [OSHA 60]: If so, please describe the situation.

LEGAL

[82] Legal [OSHA 83]: If you are a private sector employer, did you consider a smoking control policy in order to reduce potential liability?

[83] Legal [OSHA 84]: If your company has been involved in smoking-related litigation, have you initiated smoking control policies to reduce the possibility of further litigation?

[84] Legal [OSHA 87]:

a. Are businesses facing legal pressure to implement general clean indoor air policies?

b. What legal problems have been encountered when establishments have attempted to establish or modify indoor air quality policies?

SMOKING OR INDOOR AIR
POLICIES, REGULATIONS OR ORDINANCES

[85] Smoking or Indoor Air Policies, Regulations or Ordinances [OSHA 75]: In order to assist OSHA in developing a more complete profile of existing workplace practices in dealing with hazards associated with poor indoor air quality, comment is requested on the following questions: How many workers in your workplace are affected by your current policy on indoor air quality?

a. What type of costs (e.g., capital, operating or maintenance costs) have been involved with voluntarily adopting or changing indoor air quality, including smoking, policies?

b. Have there been any cost savings (e.g., maintenance, insurance, productivity)?

c. Are there any options you have considered adopting and have analyzed, but have not yet adopted (including ones that have been rejected)?

d. What are they, what costs and benefits have you identified with them, and why have you not yet adopted them?

e. What is the nature of your business?

f. What is the size of the workforce at your establishment?

[86] Smoking or Indoor Air Policies, Regulations or Ordinances [OSHA 76]:

a. How have personnel relationships been affected by workplace policies related to indoor air quality, especially smoking?

b. Have there been any quantifiable benefits in this area related to the implementation of new indoor air quality policies?

[87] Smoking or Indoor Air Policies, Ordinances and Regulations [OSHA 86]:

a. In your local area (municipality or State) how many establishments have voluntarily established indoor air policies?

b. What do these policies entail?

c. Do these policies vary between types of businesses?

d. Why were these policies adopted?

[88] Smoking or Indoor Air Policies, Ordinances and Regulations [OSHA 88]: Where states or localities have decided to regulate smoking in the workplace, OSHA requests that copies of state or local smoking rules, regulations, or guidelines be submitted.

a. Why were certain types of workplaces included in the above but others omitted?

b. Please identify sections of this rule, regulation, or guideline that are different for certain types of employers or conditions of employment (e.g., restaurants, private offices, and factories) as compared to others (e.g., general office space and public space).

c. Are structural changes in the ventilation system or the building of barriers between smoking and nonsmoking sections ever a specified option for employers in attempting to comply with the rule, regulation, or guideline?

[89] Smoking or Indoor Air Policies, Ordinances and Regulations [OSHA 89]: Have there been any difficulties in implementing, monitoring, enforcing, and evaluating the effectiveness of these rules, regulations, or guidelines in reducing exposure of nonsmokers to PTS?

[90] Smoking or Indoor Air Policies, Ordinances and Regulations [OSHA 90]:

a. Has compliance with these various rules, regulations, or guidelines been measured? If so, how?

b. Have these various rules, regulations, or guidelines, been effective in reducing the amount of PTS in various workplaces?

c. What sort of violations are you experiencing?

d. What are the penalties for noncompliance?

e. What type of resources are being used to ensure compliance with the rule, regulation, or guideline?

[91] Smoking or Indoor Air Policies, Ordinances and Regulations [OSHA 91]: In the workplace experience, what costs or savings have resulted in your complying with the rule, regulation, or guideline?

[92] Potential Content of OSHA Regulation [OSHA 92]: If OSHA determines, on the basis of adequate evidence, that regulatory action is needed to protect employees from adverse health effects related to indoor air quality, what elements do you believe such regulation should include? Please provide the basis for your suggested element(s).

CONSTITUENTS OF INDOOR AIR IN THE WORKPLACE

The following represents a preliminary listing of various constituents of indoor air.

IAQ Category		Constituent
1.	Inorganic gases	nitrogen dioxide*
		carbon dioxide*
		sulfur dioxide*
		carbon monoxide*
2.	Non-biological particles	fine particles (including metals)*
		coarse particles*
		asbestos*
		environmental tobacco smoke*
3.	Biological pollutants	animal dander
		bacteria, viruses*
		animal excreta
		fabric fibers
		molds, mildew*
		fungi*
4.	Radioactive	radon*
		electromagnetic radiation
5.	Gas-phase ("volatile") organic compounds	kerosene

IAQ Category	Constituent
	mineral spirits
(Aliphatic hydrocarbons)	n-hexane
	haptane
	n-decane
	n-dodecane
(Aromatic hydrocarbons)	toluene
	styrene
	ethylbenzene
	benzene*
	xylenes*
(Halogenated carbons)	p-Dichlorobenzene
	pershloroethylene
	methylene chloride
	1,1,1-trichloroethane
	propylene dichloride
	chlordane
	ethylene
	polyvinyl chloride
	vinyl chloride
	freon
	polychlorinated biphenyls
	methyl chloride
	carbon tetrachloride
	trichloroethylene

IAQ Category	Constituent
	chloroform
(Alcohols)	isopropanol
	ethanol
	methanol
	ethylene glycol
	benzyl alcohol
	phenol
	cresol
(Ketones)	acetone
	methyl ethyl
	methyl isobutyl ketone
(Aldehydes)	formaldehyde*
	acetaldehyde*
	acrolein*
(Organic nitrogen/ phosphorous	malathion
	unspecified amines
	triethanolamine
	isopropanolamine
	ethylene diamine
	acrylonitrile
	methylamine
	pyridine
	aniline
	nitrosodimethylamine*

IAQ Category	Constituent
	hydrazine
	parathion
	endosulfan
	acrylamide
(Polynuclear aromatic compounds)	phenanthrene
	benzo (a) pyrene*
(Miscellaneous gas-phase organics)	phosphoric acid
	acetic acid

* "common constituents"